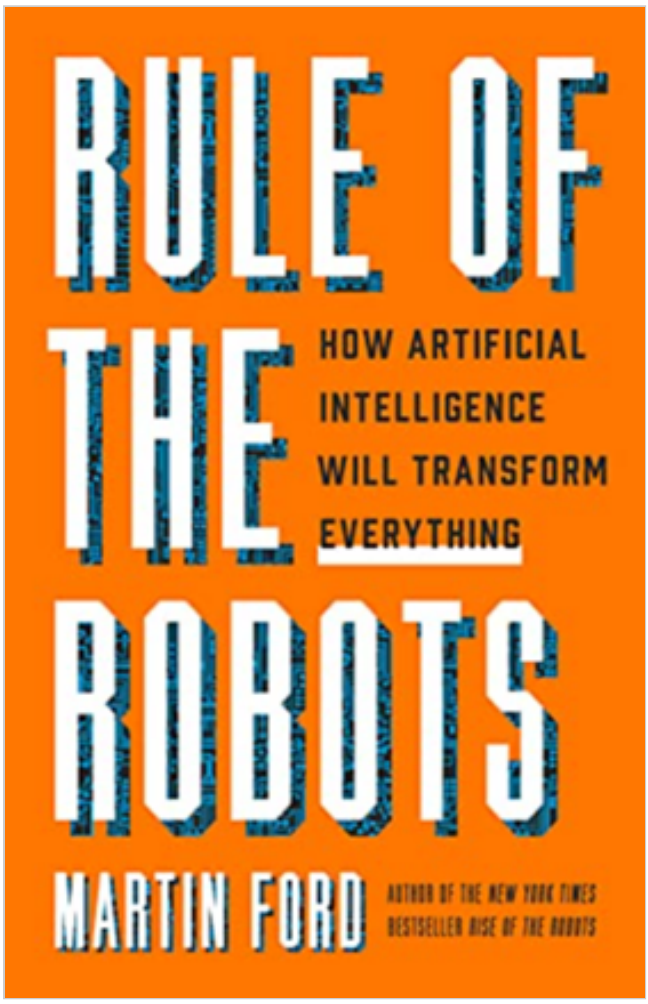
Monthly Labor Review

BLS

March 2022

The artificial intelligence storm is upon us: are we ready?

Rule of the Robots: How Artificial Intelligence Will Transform Everything. By Martin Ford. New York, NY: Hachette Book Group, Inc., 2021, 311 pp., $30.00 hardcover.



Star Trek or *The Matrix*—which fictional future would you rather live in? At the conclusion of his 2021 book, *Rule of the Robots: How Artificial Intelligence Will Transform Everything*, futurist Martin Ford juxtaposes these starkly different sci-fi universes, not just for dramatic effect but also as an illustration of where human society may be headed. In *Star Trek*, Earth is a near-perfect utopia, where poverty and most disease are absent, and humanity's only concerns revolve around space exploration and alien adversaries. But in *The Matrix,* manmade intelligent machines enslave most of humanity, confining the few remaining free people to a dystopian, destitute world. Reducing humanity's future to this dichotomy is extreme, but it compellingly captures Ford's visions of both the benevolent and malevolent effects that robotic technological advancements and artificial intelligence (AI) will have on the world.

In 2015, Ford rattled the economics and technology fields with his exalted book, *Rise of the Robots: Technology and the Threat of a Jobless Future*. In that book, Ford admonished readers that a technological storm is approaching—if not already here—and that millions of workers around the globe are in its wake. He warned that

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potentially half of all jobs could be automated away, going so far as to suggest that the most skilled, highest paying jobs, such as those of surgeons and lawyers, could be the most vulnerable to replacement by robots and computers. The speed of technological and social change is nearly incomprehensible, and the interminable evolution of the labor market seems to be unraveling like a never-ending breaking news story. Ford's 2021 followup, *Rule of the Robots*, lucidly synthesizes economic metrics and interviews of AI experts, informing readers of potential disruptions to global labor markets and calling to action industry and government leaders.

At the end of chapter 1, Ford proclaims that his book is intended as a guide for thinking about technological advancements, preparing for what is to come, and identifying ways to thrive in the future we are creating for ourselves. But it is later, in chapter 6—a section focusing on disappearing jobs and the economic consequences of AI—where the author states his central argument: "That AI is indeed different…that artificial intelligence is a systematic, general-purpose technology not unlike electricity, and it will therefore ultimately scale across and invade every aspect of our economy and society." Indeed, from the outset, Ford asserts that AI will one day likely be as ubiquitous in our lives as electricity and that all technology we interact with will be augmented or influenced by AI in some way. And he dedicates most of the book to discussing where automation and AI technology are emerging and advancing.

While Ford may be largely speculating about the future, his assertions are persuasive and more than simple conjectures, and he cogently thwarts counterarguments to his presages. Skeptics of Ford's prophecy about an impending labor force doom often cite historical cases of labor force disruptions in which workers successfully transitioned into the emerging industries responsible for those disruptions. In the late 1800s, about half of American workers were employed in agriculture, but that share is only between 1 and 2 percent today. While advances in agricultural technology—tractors, combine harvesters, pesticides—vaporized millions of agricultural jobs, a rising manufacturing sector created new jobs, absorbing the agricultural workers displaced by technological disruption. And today, with the decline in manufacturing, nearly 80 percent of workers in the United States are employed in service industries.

However, Ford persuasively argues that the disruption brought on by AI and automation is different, substantiating his claim with interviews of top AI experts and many examples of companies integrating AI and automation into their business practices. To make this disruption more vivid for the reader, Ford invokes images from the 2004 film *I, Robot*, in which the protagonist played by Will Smith asks, "Can a robot write a symphony? Can a robot turn a canvas into a beautiful masterpiece?" The robot Smith is interrogating wittily replies, "Can you?" But Ford points out that smart algorithms already *can* paint original works of art, compose classical music, and even write computer code. Facebook's Aroma tool, for example, functions as an autocomplete tool for computer programming, foiling the idea that coding is one of the most lucrative skills of the future. Dozens of startup

companies now employ AI-powered chatbots that automate away customer service jobs. Creator, Inc., has designed a robot that completes gourmet-quality hamburgers without a single person involved in the process. Amazon Go convenience stores have made cashier-less retail possible, allowing consumers to simply walk into and out of a store with products without ever interacting with a cashier or a machine. Pharmacy robots and the healthcare innovations of companies like Qure.ai and Lunit can prepare prescriptions and make medical diagnoses with flawless accuracy, eliminating once highly complex jobs such as those of pharmacists and radiologists.

Ford goes on, enumerating an ostensibly infinite number of ways in which AI and robots may substitute workers. But the zenith of AI technological innovation is artificial general intelligence (AGI)—the ability of a machine to think, understand, or learn any intellectual task as a human can. Most experts surveyed by Ford believe that AGI is still quite some time away, at least half a century into the future, but some techno-optimists predict it could be here sooner, with unthinkable implications for the labor force and human society.

Ford does offer a guide through the tangled web of an increasingly technological future. When commenting on which jobs are the safest and most immune to automation, he identifies three key conditions that make a job hard or impossible to automate: creativity, building meaningful and complex relationships, and significant dexterity and problem-solving skills. Nurses, elder-care assistants, plumbers, electricians, and mechanics are the few occupations Ford directly cites as safe bets. It would have been nice if he had provided even more guidance on what jobs workers should pursue, but I think his general guidance is intuitive. And the dearth of guidance on this topic reflects the enigmatic implications emerging AI and technology may have for the labor market.

Harkening to the *Star Trek* versus *The Matrix* analogy, Ford suggests that the greatest economic challenge surrounding advances in AI and automation will be how the bounties from these advances are distributed. According to some analyses, AI could add between $13 and $16 trillion to worldwide economic output by 2030, and AI will almost certainly lead to unimaginable innovations in the sciences, engineering, and medicine. But Ford worries that only the wealthiest people and companies will reap the bulk of benefits from AI and automation, steering humanity away from that idyllic *Star Trek* future. He cites concerning U.S. metrics to make this point, referencing the rising wealth inequality in the United States (evidenced by the Gini coefficient), a declining number of prime-working-age men in the U.S. workforce, a plunging ratio of well-paying jobs, and growing underemployment of recent college graduates. Ford also explains how the coronavirus disease 2019 (COVID-19) pandemic may expedite automation and exacerbate these trends, citing the history of businesses eliminating workers during economic downturns and then avoiding subsequent rehiring by automating business processes.

Ford's key proposed policy response to these problems is universal basic income (UBI). UBI would give everyone a fixed amount of money on a consistent basis, and, if successful, help workers who lose their jobs to automation, stimulate entrepreneurship, and help people with expenses such as rising college tuition and medical bills. There

are several counterarguments to this proposal—it is too expensive, provides disincentives for work, and cultivates a nanny state. But Ford carefully assays and counters these criticisms, asserting that humanity's uncertain future needs unconventional solutions and that UBI is the most pragmatic and effective policy proposal of all.

Ford discusses a cornucopia of other topics related to AI and automation, including a brief history of computers and AI, the rise of surveillance tools, AI-powered weapons, and the risks of AI. *Rule of the Robots* is colloquial yet canny, enlightening, and valuable to readers of all levels of expertise. I am always on the lookout for works by Ford, and I think you should be too.